

REMARKS

In the Office Action mailed July 9, 2004, the examiner withdrew all prior rejections in this application, and further withdrew all prior indications of allowable subject matter in view of newly cited references. In particular, pursuant to the Office Action mailed July 9, 2004, applicants' pending claims 1-28, 33-51, 53-54, 56-62, 64-65, 67-73, 77-88 and 90-96 now stand rejected for alleged obviousness in view of a primary combination of references including Gobush, U.S. Patent 5,803,823; Gobush, U.S. Patent 6,241,622; and Bouton, U.S. Patent 5,472,205. Of these claims, Mook, U.S. Patent 5,067,719 has been further cited in support of the rejection of claims 12-28, 34-51, 53-54, 61, 62, 64, 77-88 and 90-96.

By this Response, applicants have amended each of the independent claims 1, 7, 34, 60 and 86 in this application to recite an apparatus or system incorporating "an image capture device consisting essentially of a single camera" (emphasis added) for capturing multiple post-impact images of a golf ball. Applicants respectfully note that none of the art cited by the examiner discloses or suggests a "single" camera system particularly as recited in applicants' claims.

Independent claim 69 and related dependent claims 70-73 and 85 have been canceled. Dependent claim 61 has also been canceled. Dependent claims 77 and 82 have been amended for conformance with cancellation of claim 69.

In addition, by this Response, applicants respectfully note the newly cited Mook reference which discloses a striped golf ball, in lieu of the prior-cited Balmat (U.S. Patent 5,713,799) reference which also discloses a striped golf ball. Pursuant to the prior examiner interview conducted May 26, 2004, the examiner agreed that the Balmat reference, which does not pertain to a computerized ball flight monitor apparatus or system, did not support the previous obviousness rejection. Applicants respectfully note that the Mook reference likewise fails to pertain in any way to a computerized ball flight monitor system, and on that basis Mook fails to support the obviousness rejections for the same reasons.

Accordingly, applicants respectfully re-submit claims 1-28, 33-51, 53-54, 56-60, 62, 64-65, 67-68, 77-84, 86-88, and 90-96, now limited essentially to a single camera system, for reconsideration and allowance. These claims are believed to distinguish clearly and patentably from the cited art, particularly for the reasons set forth in more detail in the following remarks.

In addition, with this Response, applicants submit a Supplemental Information Disclosure Statement, citing Katayama, U.S. Patent 6,042,483. This supplemental submission is accompanied by the requisite fee pursuant to 37 CFR 1.17(p).

Discussion of Claims as now Presented

Independent claims 1, 7, 34, 60 and 86 of this application have each been amended by this Response to require "an image capture device consisting essentially of a single camera" (emphasis added) for capturing two or more images of the golf ball following impact with a golf club head. The multiple images captured by this "single" camera are communicated to a "processor" which analyzes the images to determine important post-impact ball kinematics, including "three-dimensional velocity" (claims 1 and 60), "three dimensional displacement" (claim 7), and ball "spin" (claims 34 and 86) such as backspin and/or side spin.

More particularly, as recited in claims 1, 7 and 60 "three dimensional velocity" or "displacement" of the golf ball is determined by the processor, based on the multiple images from the "single" camera, by "extrapolating perimeters" of the post-impact images and by "determining three-dimensional spatial positions". Dependent claims 12-28, 77-81 and 83 further recite a ball marking in the form of a "stripe" (e.g., see claim 12) or "closed loop" (e.g., see claim 13) that appears in the post-impact images for processor analysis to determine "spin", such as backspin by "linear extrapolation" of the marking in the multiple images (e.g., see claim 17), and/or side spin based on the "curvature" of the marking in the multiple images (e.g., see claims 18 and 25).

Independent claims 34 and 86 are directed more specifically to the apparatus and system using the single camera to obtain multiple post-impact images of the golf ball having a "marking" that extends at least halfway around

the ball (claim 34) such as an elongated "stripe" (claim 86). The "processor" analyzes the multiple post-impact images to determine ball "spin", including at least an analysis of "curvature" (claims 34 and 86) of the marking or stripe. This analysis of "curvature", as previously noted, permits an automatic determination of post-impact side spin of the golf ball. However, the "processor" may also analyze a "linear extrapolation" of the marking or stripe to additionally determine backspin of the golf ball in flight (e.g., see claims 40-41 and 92). Such automatic determination of post-impact ball spin may be supplemented further by a determination of three-dimensional post-impact ball velocity (e.g., see claims 43-45 and 90-91).

The foregoing determinations of post-impact ball flight characteristics, including three-dimensional velocity, backspin, and side spin, are all obtained automatically from multiple post-impact images from a single camera. The prior art does not disclose or suggest any single-camera system for providing applicants' claimed automatic determination of these ball flight parameters. To the contrary, the prior art of record when considered as whole by a person skilled in the relevant art, clearly teaches and leads away from applicants' claimed single-camera apparatus and system.

In addition, to the extent that the cited art of record has any capability to determine post-impact ball flight parameters, albeit in a multi-camera system, the prior art does so in a different way. Specifically, the cited art (i) does not determine three-dimensional velocity by "extrapolating perimeters" of the golf ball in post-impact images, (ii) does not determine backspin by a "linear extrapolation" of an elongated marking or stripe in multiple post-impact images, and (iii) does not determine side spin by an analysis of "curvature" of that same elongated marking or stripe in the post-impact images.

Accordingly, applicants respectfully submit that the claims as now presented distinguish clearly from the cited art.

Discussion of the Cited References

In the Office Action, the examiner relies upon a primary combination of references to support the rejection of applicants' claims for obviousness, namely, Gobush, U.S. Patent 5,803,823; Gobush, U.S. Patent 6,241,622; and Bouton,

U.S. Patent 5,472,205. For claims 12-28, 34-51, 61, 62, 64, 77-88 and 90-96, the examiner additionally relies upon Mook, U.S. Patent 5,067,719.

As understood, the examiner relies upon the Gobush '823 reference for its disclosure of monitoring the swing path of a golf club head prior to impact with a golf ball, but acknowledges that Gobush '823 does not teach post-impact tracking of golf ball flight parameters. Office Action, p. 2.

To fill this deficiency in Gobush '823, as best understood, the examiner cites the Gobush '622 reference. Specifically, the examiner contends that Gobush '622 teaches a three dimensional velocity determination by "extrapolating perimeters" of the golf ball (Office Action, p. 3). But, curiously, and undoubtedly due to the fact that the examiner himself doubts the veracity of the foregoing assertion, the examiner states in the very next sentence that "[d]escribed variants of these extrapolations ... are believed to be well encompassed in the 34 equations" set forth in the Gobush '622 reference (Office Action, p. 3, emphasis added).

In other words, as best understood, the examiner concedes that the Gobush '622 reference does NOT in fact teach a three dimensional velocity determination by "extrapolating perimeters" of the golf ball in flight, but instead that Gobush '622 describes "variants", i.e., a different method and apparatus seeking to derive this ball flight information. Yet, the examiner provides no explanation or analysis stating why he believes the "variants" disclosed in Gobush '622 render applicants' claimed invention obvious, or what (if anything) in the "34 equations" provides factual support for the examiner's position. As such, the rejection is clearly based upon the examiner's own personal, subjective and undisclosed opinion – plainly an insufficient and wholly improper basis for an obviousness rejection.

Applicants do not dispute that the Gobush '622 reference discloses and teaches a variant or different method and apparatus to determine post-impact ball velocity or spin. Applicants further do not dispute that a person skilled in the art might find it obvious to use the "ball tracking system" of Gobush '622 with the "club tracking" system of Gobush '823, as asserted by the examiner. However, applicants contend that such combination of references inherently and necessarily results in a system that determines post-impact ball flight parameters

such as velocity and spin in a way that is different from the apparatus and system recited in applicants' claims.

A cursory review of the Gobush '622 reference indicates that applicants' foregoing critique is clearly correct. The Gobush '622 reference (i) does not determine three dimensional ball velocity by "extrapolating perimeters" of the ball (as recited in applicants' independent claims 1, 7 and 60), (ii) does not determine backspin by a "linear extrapolation" of an elongated marking or stripe in multiple post-impact images, and (iii) does not spin by an analysis of "curvature" of that same elongated marking or stripe in the post-impact images (see applicants' claims 46 and 86). Also, Gobush '622 also fails to disclose or suggest a single camera system as now recited in applicants' claims.

To the contrary, the Gobush '622 reference uses two separate and distinct cameras 36 and 38 (or 136, 138) to obtain two post-impact images of the golf ball in flight, wherein this golf ball has an array of small reflective spots or dots (col. 4, lines 12-13). The processor in the Gobush '622 system identifies the locations of these spots in the post-impact images, and then (based on preliminary calibrations) manipulates the spot location data (in accordance with the "34 equations") to determine post-impact ball velocity and certain spin information. NOTHING in the Gobush '622 reference ever mentions, discloses, suggests, or teaches in any way that the ball perimeter in each image is determined by any means, extrapolation or otherwise, for deriving post-impact velocity information. Similarly, NOTHING in the Gobush '622 reference remotely teaches or hints that a "linear extrapolation" of an elongated marking or stripe is used to derive backspin information, or that "curvature of such marking or stripe can be analyzed to derive side spin information.

Applicants respectfully contend that their claimed apparatus and system, wherein post-impact ball kinematics are determined by "extrapolating perimeters" of the golf ball, or by a "linear extrapolation" of an elongated marking or stripe, or by analyzing the "curvature" of such marking or stripe, is not obvious under 35 USC 103 in view of any disclosure or teaching or suggestion found in the Gobush '622 reference. In this regard, the examiner's sole basis for the obviousness rejection appears to rest upon the vague and noninformative assertion "[d]escribed variants of these extrapolations are believed to be well

encompassed in the 34 equations ..." (Office Action, p. 3). Which one or ones of these equations is believed to provide the requisite teaching or suggestion to support the rejection? And why? Mention of "Cartesian" position, etc., may indeed reside in those "34 equations", but why and how does that render applicants' claimed invention obvious? The examiner does not say, and by that silence, falls to provide proper support for the rejection.

In addition, NOTHING in the Gobush '622 reference discloses or suggests applicants' claimed single camera system. In this regard, applicants acknowledge mention of a prospective single camera system (for use with a spotted ball) in a previously cited reference of record in this application, namely, Sullivan, U.S. Patent 4,158,853, at col. 3, lines 46-50. However, applicants respectfully note that Sullivan never provides an enabling disclosure as to how a functional single camera system might be constructed. In point of fact, applicants note that the golf industry has long sought a workable single camera ball flight monitor system. The Sullivan '853 and Gobush '622 references (i) include a common inventor and (ii) are owned by a common assignee, with respective filing dates separated by 21 years. Clearly, a workable single camera system has been beyond the grasp of the Sullivan and Gobush inventors. Given the industry pressure to develop a commercially viable single camera system, one must necessarily conclude that, based on these references, a workable single camera system is in fact not obvious to a person skilled in the relevant art.

Bouton, U.S. Patent 5,472,205 has been cited by the examiner in combination with the Gobush '823 and '622 references, in support of the rejection of applicants' claims for obviousness. However, upon studying the Bouton reference and the examiner's remarks pertaining thereto, applicants do not understand why Bouton has been cited, or how the examiner perceives applicants' invention to be obvious from some asserted combination of Bouton with the two Gobush references.

Bouton discloses a system for optically monitoring a number of golf club head parameters as a golf club is swung over a mat having various arrays of optical sensors. Based on the monitored club parameters, Bouton predicts a flight path for a golf ball. However, Bouton has no camera system for producing post-impact images of the golf ball in flight, and further has no teaching or

suggestion related to analysis of such post-impact images to determine ball flight kinematics.

Assuming, *arguendo*, that a person skilled in the art attempted to combine the Bouton reference with either or both of the cited Gobush references, applicants' claimed invention would not result from that combination. At best, the club head monitor system of Gobush '823 would be replaced by Bouton's club head monitor system, for use in combination with the multi-camera ball flight monitor system of Gobush '622. As noted above, the Gobush '622 reference does not determine three dimensional ball velocity based on extrapolated perimeters of the ball in post-impact images taken by a single camera, and does not determine backspin by a "linear extrapolation" of an elongated marking or stripe, and does not determine side spin by analyzing the "curvature" of that elongated marking or stripe. Nothing in Bouton overcomes or even addresses these deficiencies.

Accordingly, applicants' claims as now presented are believed to distinguish clearly and patentably from any conceivable combination of the Gobush '823, Gobush '622, and Bouton references.

Mook, U.S. Patent 5,067,719 has been added to the above-discussed primary combination of references for supporting a rejection for obviousness of applicants' claims reciting the "marking" or "stripe" on the ball used to determine post-impact ball spin such as backspin and/or side spin. In this regard, the examiner acknowledges that the Gobush '622 reference uses an array of reflective dots on the ball, and not an elongated marking or stripe as claimed by applicants (Office Action, p. 5). The examiner asserts that the Mook reference supplies this deficiency, namely, a golf ball with "colored circumambulatory stripe(s)" used "in a related application" (Office Action, p. 5). Not surprisingly, the examiner makes no attempt to define the phrase "in a related application".

Applicants contend that the Mook reference is clearly NOT directed to "a related application", i.e., Mook does not pertain in any way to the computer-based golf club and ball flight monitor systems disclosed in the Gobush '823, Gobush '622 and Bouton references.

The Mook reference pertains to a golf ball having three equatorial stripes oriented on orthogonal axes, wherein these three stripes are each formed from

a different primary color. See col. 2, lines 14-18. These different-colored stripes in Mook are intended to provide the golfer with directly visible post-impact "spin" information, since the three different colors on a rapidly spinning ball will mix and blend in various proportions to provide the appearance of a range of different colors as the ball travels in flight away from the golfer. That is, Mook asserts that a ball in flight with backspin will appear to the golfer to have a first color different from the same ball in flight with a different spin direction, such as side spin. See col. 4, line 62 through col. 5, line 41. Interestingly, Mook further asserts that his equatorial stripes are also useful as an alignment device for proper pre-impact club head address with the golf ball. See col. 4, lines 24-30.

In a prior Office Action, the examiner cited Balmat, U.S. Patent 5,713,799, characterizing the striped golf ball of Balmat as an "analogous golf assistance system" (Office Action mailed April 6, 2004, p. 2). Balmat disclosed a golf ball having two different-colored stripes, one of which was formed "non-equatorial", for improved pre-impact club head address with the golf ball. The Balmat reference was discussed in the course of the examiner interview with applicants' representative (Mr. Apley) on May 26, 2004, and further addressed in the Response filed June 4, 2004. Based on the examiner interview, it was understood that the examiner agreed that Balmat was not in fact directed to an "analogous golf assistance system", as evidenced by the fact that all rejections based upon Balmat have now been withdrawn.

Yet, inexplicably, the examiner has merely substituted the Mook reference – a reference that is clearly no more "analogous" or "related" to a computer-based ball flight monitor than Balmat. The ONLY difference between Mook and Balmat is that Mook's three colored stripes are all "equatorial" whereas one of Balmat's two stripes is "non-equatorial". Both references rely upon the visual perception of the golfer. Neither reference discloses a computer or any camera equivalent for producing post-impact images of a golf ball in flight.

Absent some prior knowledge and understanding of applicants' invention, a person skilled in the art would see no reason or benefit to use Mook's multi-colored, multi-striped golf ball in the ball flight monitor system of the Gobush '622 reference. In such combination, post-impact images of the ball in flight would be freeze-frame images and thus could not reveal Mook's desired color mixing or

blending to reveal spin information – contrary to the essential teaching and purpose of Mook's invention. Moreover, such attempted combination would clearly fail to disclose or suggest applicants' claimed post-impact determination system and method, namely, determination of (i) three-dimensional velocity by "extrapolating perimeters" of the golf ball in the post-impact images, (ii) backspin by a "linear extrapolation" of an elongated marking or stripe in multiple post-impact images, and (iii) side spin by an analysis of "curvature" of that same elongated marking or stripe in the post-impact images – all in a single camera system. In this regard, it is noted that applicants' invention is workable with a single elongated marking or stripe on the ball; Mook's invention is wholly inoperable if a single stripe is used. Where, applicants ask, does the asserted combination disclose or suggest modifying Mook to use a single stripe?

One must conclude that the Mook reference has been cited based upon an improper hindsight analysis, wherein the examiner's prior knowledge and understanding of applicants' claimed invention has caused the examiner to search the prior art for any disclosure of a striped golf ball, and then baldly assert that the reference is from "a related application" for purposes of justifying the obviousness rejection. Any person having virtually any degree of skill in the relevant art would clearly see that Mook's invention is NOT "a related application" at all.

Accordingly, applicants respectfully submit that claims 1-28, 33-51, 53,-54, 56-60, 62, 64-65, 67-68, 77-84, 86-88 and 90-96 are clearly in condition for allowance over any teaching, suggestion, or combination of the cited art, considered alone or in any combination.

Supplemental Information Disclosure Statement

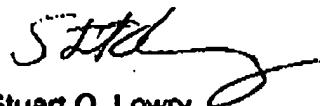
As noted previously herein, applicants submit herewith a supplemental disclosure statement for purposes of citing Katayama, U.S. Patent 6,042,483. The Katayama reference discloses a post-impact ball flight monitor method employing a golf ball having a pair of orthogonally oriented stripes. Among other things, like the prior-cited references of record in this application, Katayama discloses a method and system using multiple cameras.

Conclusion

In conclusion, in view of the foregoing discussion and related revisions to this application, claims 1-28, 33-51, 53-54, 56-60, 62, 64-65, 67-68, 77-84 86-88 and 90-96 are believed to be in proper condition for allowance. A formal Notice of Allowance is believed to be in order, and is therefore respectfully requested.

Respectfully submitted,

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